Pacific Science, vol. 54, no. 3: 251–263

Haast and the Moa: Reversing the Tyranny of Distance[1]

RUTH BARTON[2]

ABSTRACT: The powerful position of patrons and interpreters at the imperial centers and the secondary, supportive position of colonial contributors to the scientific enterprise have been emphasized in the literature on colonial science. For Sir Julius von Haast, however, New Zealand provided both the opportunity and the resources for a scientific career of international fame. Moa bones were his most valuable resource. The exchange and sale of moa bones stocked his museum; gifts of moa skeletons brought him honors; and he began to claim that being at the periphery and having seen the bones in situ gave his interpretations credibility.

THERE ARE THREE leading characters in this story of the scientific moa. Julius Haast (1822–1887), who was German-born, arrived in Auckland late in 1858, in the employment of an English shipping company, to investigate the prospects for German immigration to New Zealand. He stayed to become one of New Zealand's leading colonial geologists. In 1858, the moa itself (16 million yr B.P.–ca. A.D. 1600) and its creator-discoverer, Richard Owen (1804–1892), had been famous for almost 20 years. Owen, who had never set foot in New Zealand, was the archetypal scientist of empire whose reputation was made through interpreting the natural riches of the colonies—naming living and extinct fauna as he assigned their places in the elaborate classification system of species, genera, and families. Nevertheless, within 20 years, the German immigration agent also became a world expert on the moa and wrung from Owen the admission, "I begin to feel that my share in the work of restoration [of the extinct birds of New Zealand] is over.... You stand at the head of my successors in that Work, and merit every honour & recompense for your share in the Natural History of your fair Islands" (1874 [cited by Gruber 1987*a*: 89–90]).

The moa were a family of large flightless birds that had occupied the ecological niche of browsing animals in New Zealand. In the 1830s, Maori reported them as extinct and they are now considered to have become rare by 1600 (Anderson 1989: 178), but in the mid-nineteenth century it was plausible to hope that groups might still exist in isolated parts of the South Island (Colonial Museum, Haast to Hector, 5 November 1862, MU198/1). There were many different moa species—some tall and thin, some large and heavy, and others about the size of a large turkey. The smaller species were more numerous, but the gigantic ones captured popular and scientific imagination. The largest stood 12 ft or 3.6 m high, higher in many nineteenth-century articulations when legs and neck were extended vertically rather than allowed to bend or curve (Anderson 1989: 60–62).

The moa first came to world scientific attention in 1839 when John Rule, an ex-naval surgeon from Sydney, tried to sell an unusual piece of bone to Owen, then assistant conservator at the Hunterian Museum of the Royal College of Surgeons. Initially sceptical of Rule's claim that the bone belonged to "an extinct bird of the eagle kind," Owen compared the piece with mammal bones, concluding that it was a fragment of thigh bone from a flightless bird similar in size to an ostrich. In November 1839, he exhibited the 6-inch piece of bone and presented his ostrich interpretation before sceptical col-

[1] Manuscript accepted 1 November 1999.
[2] Department of History, University of Auckland, Private Bag 92019, Auckland, New Zealand (phone: 64 9 3737599, ext. 7302; E-mail: r.barton@auckland.ac.nz).

leagues at the Zoological Society of London (Rupke 1994: 124).

Meanwhile, in New Zealand, William Colenso and William Williams of the Church Missionary Society had begun to take Maori reports seriously and were paying Maori for bones of the extinct bird (Andrews 1986: 127). In 1842 Williams sent a small collection of bones to his old teacher, William Buckland, reader in mineralogy and geology in the University of Oxford, who gave them to Owen. Owen found a large leg bone that matched his prediction "exactly," he said (Rupke 1994: 125), and in 1843, in a communication to the Zoological Society, he named the bird *Dinornis Novae Zealandiae.*

The news generated great excitement in London. Prince Albert asked to meet Owen and to see his giant bird (Figure 1). A leading member of the Zoological Society described it as "the greatest zoological discovery of our time" (Gruber 1987*b*: 343–347, Rupke 1994: 127). Scientifically, the prediction was taken to establish the reliability of Owen's Cuvierian, functionalist methods. Whether sent directly to him or not, almost all bones from missionaries and government officials in New Zealand passed through Owen's hands for formal description and naming. But not all. In 1842, in an early act of scientific independence, Colenso had written his own account of moa bones and sent an article to the *Tasmanian Journal of Natural Science.* However, local publication was slow, and Owen's 1843 paper had priority (Andrews 1986: 124–131, Gruber 1987*b*: 339–347).

Haast, like Owen before him, used the moa to build his scientific career. This account illustrates some well-recognized relationships between European centers and colonial peripheries (Basalla 1967, Latour 1987, Newland 1991). Haast and other geologists, missionaries, and government officials in New Zealand sent collections of moa bones to the expert in London who named and interpreted. When colonials wanted to publicize their own interpretations, they were often dependent on the patronage of men of science in imperial centers to present their letters or articles to scientific societies. When they sought recognition for their achievements, they sought them in European forums.

But the story of the scientific moa also has twists and complexities that require modifications to disjunctive models of dependent, deferential colonial science at the periphery and imperial, theoretical science at the centers of calculation. The story here supports some of the qualifications and criticisms of Basalla's model made by MacLeod (1982), Inkster (1985), Reingold and Rothenberg (1987: xii–xiii), Butcher (1988), and Endersby (1997: 83–96). Haast himself, contrary to the model of colonial science, obtained most of his scientific education in New Zealand. He was oriented to more than one imperial center. German-born, naturalized-British, and trained by the Austrian Ferdinand Hochstetter, his most important links were with London and Vienna. More significantly, he had *inter*colonial relationships that were not mediated by the center. The most noteworthy twist to the usual story is that when Haast and his fellow colonials began to assert their independence and to ask that their contributions to the systematic enterprise be properly acknowledged, they protested not only at the unequal and exploitative relationship, but also questioned the competence of the center, arguing that those at the periphery had interpretive advantages. Moa bones could not be transported to the imperial center of calculation without loss.

The recognition of the importance of local flora as a resource for colonial science in James Moore's analysis of the career of Baron Ferdinand von Mueller, the German-born Australian botanist, can be extended to Haast. When Mueller moved to Australia for the sake of his health in 1847, he turned to account his unique access to Australian plants and his early medical-cum-scientific training. Through decades of hard labor collecting, comparing, and naming, Mueller turned the botanical wealth of Australia, "green gold" (in Moore's metaphor), into symbolic capital. He became the internationally recognized expert on Australian botany. His capital was reinvested. Naming new plants after favored colleagues and gifts of exotic plants were a means of extending

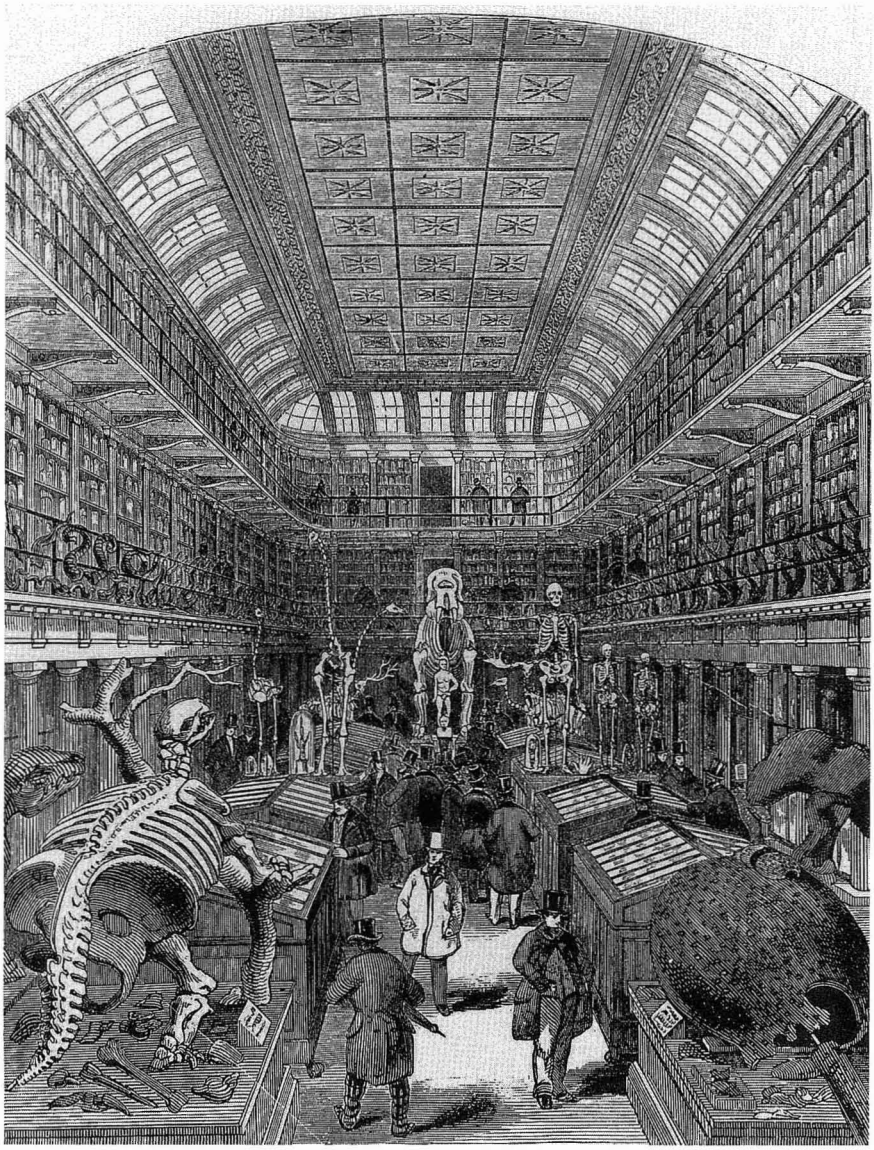

FIGURE 1. The moa in London with the great animals of the world. The main hall of the new museum at the Royal College of Surgeons in 1845. Front left, fossil skeleton of the mylodon; front right, fossil shell of the gigantic extinct armadillo; center rear, a recently deceased elephant. The moa, a plaster cast of *Dinornis giganteus,* is on the left in the middle distance with an ostrich farther left. (Museum of the Royal College of Surgeons 1845 : 35.)

credit to colleagues and attracting further symbolic capital to himself (Moore 1997). Most accounts of colonial science emphasize the disadvantages of peripheral location. Moore's analysis of Mueller's career, however, shows that what has been called the "tyranny of distance" (for debates see Chambers 1991 and Knight 1991) became for Mueller the advantage of location.

The story told here uses the literature of colonial science to extend previous interpretations of the significance of the moa

to Haast's career (Andrews 1986, Gruber 1987*a,* Sheets-Pyenson 1988). Identifying the moa as a valuable local resource to be invested unifies the work of moa collection and classification, emphasized by Gruber and Andrews, with the work of museum building emphasized by Sheets-Pyenson, and the work of self-promotion, noted but not emphasized by Sheets-Pyenson. Gruber's account of the changing relationship between Owen in London and the collectors in New Zealand, culminating with Haast's assertion in the mid-seventies of his competence to classify and interpret, is here extended to include later New Zealand criticisms of Owen's work. Moa bones and skeletons, when interpreted, became a basis for claiming scientific authority; when bartered and sold they enriched the collections of the Canterbury Museum; and when gifted to well-chosen patrons they could bring rich symbolic returns. The identification of intercolonial links in Sheets-Pyenson's study of colonial museums is given new signficance by Endersby's emphasis that intercolonial links undermine the controlling authority of the center. These intercolonial links and the suggestion here that New Zealand scientists were claiming to be a center of calculation for moa bones counter the emphasis on the secondary role of the periphery, which, although not entailed by general models of colonial science, is the usual emphasis of case studies (Basalla 1967, Latour 1987 : 215–247).

This account focuses on the international side of Haast's career. Andrews' (1986) New Zealand–centered account of moa research outlines the heated debates in New Zealand over who were the moa hunters. Haast, who was in a minority, argued that the great bird had been hunted to extinction by a pre-Maori people, and his stubborn and defensive adherence to this theory undermined his local scientific reputation. Also, as Inkster (1985) has stressed, colonial science included pragmatic applied projects that were not guided by metropolitan, theoretical concerns. There are many hints, not developed below, that local priorities were not theoretical priorities, that local reputation was not a mere shadow of international reputation, and that Haast's success in Canterbury was dependent upon his turning geology to local use.

A LAND OF OPPORTUNITY

Little is known of the life of Johann Franz Julius Haast before his arrival in New Zealand in December 1858. The usual story is that he was a widower and left a son with his wife's family in Frankfurt; he studied mineralogy and geology at the University of Bonn, but did not complete his degree; and he traveled widely in Europe, probably as a dealer in mineralogical specimens (e.g., Haast 1948 : 1–3, Maling 1990). Recent German research throws doubt on even this minimum information (Langer 1992 : 273–279). There is no record of Haast having been a student at the University of Bonn, although he may have attended public lectures given by the professors of geology and mineralogy. He served a 2-year commercial apprenticeship and later was a partner in a business dealing in fabrics and flowers. This business failed in 1850 and there is no information about his activities between 1850 and 1857. His first wife died in October 1859, after his arrival in New Zealand. But two lucky breaks turned the unsuccessful businessman and obscure immigration agent into a world-famous geologist.

Haast was lucky that his arrival in Auckland on 21 December 1858 was followed on 22 December by the arrival of the Austrian frigate *Novara* on its scientific cruise around the world (Stoffel 1993 : 24–27). Haast gained local scientific credibility by association with the *Novara* expedition's geologist, Ferdinand Hochstetter, to whom various provincial governments appealed for help with mapping local resources. Hochstetter, who stayed behind in New Zealand when the *Novara* departed, needed assistance, and the German-speaking Haast happened to be in the right place at the right time. He assisted Hochstetter in his survey of coal fields, volcanic areas, gold mines, and copper mines from Auckland to the central North Island. Then, having numerous requests from southern provinces to conduct geological surveys,

Hochstetter, with Haast, went to Nelson. There also they visited the local gold field, copper workings, and a coal mine, and with great excitement found their first moa bones. In early October, Hochstetter left New Zealand, leaving Haast, with a new reputation as a geologist, to meet local demands for geological surveys (Hochstetter 1867:9–25, Haast 1948:7–32). Hochstetter and Haast had become close friends and, over the following decades, Hochstetter remained a close adviser and patron, while Haast enriched Vienna museums with natural history specimens.

After Hochstetter's departure, Haast was employed by the Nelson province to survey its isolated western region and was consulted by the Canterbury provincial government when the contractors drilling the tunnel from Christchurch to Lyttleton abandoned the job after striking extremely hard volcanic rock. In 1861, he was appointed Canterbury Provincial Geologist. His practical successes, in identifying coal seams in Westland and in correctly advising the provincial government that the Lyttleton tunnel could be drilled within budget, increased Haast's local standing (Haast 1948:100, 114–123).

Haast's second lucky break came in late 1866 when the local owner of a large sheep station informed the provincial geologist that many large moa bones had been found when work began on draining a swamp. He offered the bones to Haast and the assistance of two workmen in excavating them. On his first visit to the Glenmark swamp in December 1866, Haast returned to Christchurch with a four-horse wagon full of bones. He estimated that the swamp contained the remains of at least 1000 moa, and many other birds—a quantity equal to the total haul of the previous 30 years (Haast 1948:481–484, Gruber 1987*a*:84). Leg bones predominated, but Haast found some near-complete skeletons, including skeletons of the largest and most impressive species. The bones were so densely packed that it was not always possible to identify individual skeletons unambiguously, but more than from any previous deposit, near-complete skeletons could be extracted from the swamp. After only a few months, Haast reported many complete individuals, representing *Dinornis gracilis, Dinornis elephantopus, Dinornis crassus,* and *Dinornis giganteus* (Haast 1869).

Haast's skeletons were not quite perfect. In late 1867, he wrote to James Hector, director of the Colonial Museum and Geological Survey in Wellington, proudly sending photographs of two articulated skeletons, but admitting that each of the skeletons had to be completed with bones from a different bird—one, for example, had a sternum from a different species (Colonial Museum, 17 November 1867, MU147/1). But Haast defended himself against Walter Mantell's accusation that the bones were all in a heap together. For many individuals, he explained, the bones were heaped together, "but the principal skeletons ... were found each *separately,* lying by themselves & the bones marked on the spot by me, as belonging together" so that the reconstructions are of single individuals (Colonial Museum, Haast to Hector, 6 August 1868, MU147/2). Mantell, son of the English geologist Gideon Mantell, had collected many of the earlier bones while traveling widely in New Zealand government employment in the late forties and early fifties. He knew that Owen's bones were *not* from identifiable individuals (Gruber 1987*a*:71), but that Owen had received assemblages from different individuals and even different species, which he had then differentiated to determine species.

MOA BONES AND MUSEUM BUILDING

Haast invested his moa bones wisely, using them to expand the resources of his embryonic Canterbury Museum; to claim intellectual rights of interpretation; and to extend his credit and reputation with men of science and men of power. Although association with the fantastic bird brought Haast international fame, his local position was insecure. In 1867, soon after the Glenmark find, the Provincial Council decreed that the Geological Survey was to be completed by mid-1868, leaving Haast with no job. After a period of worrying uncertainty, the Provincial Gov-

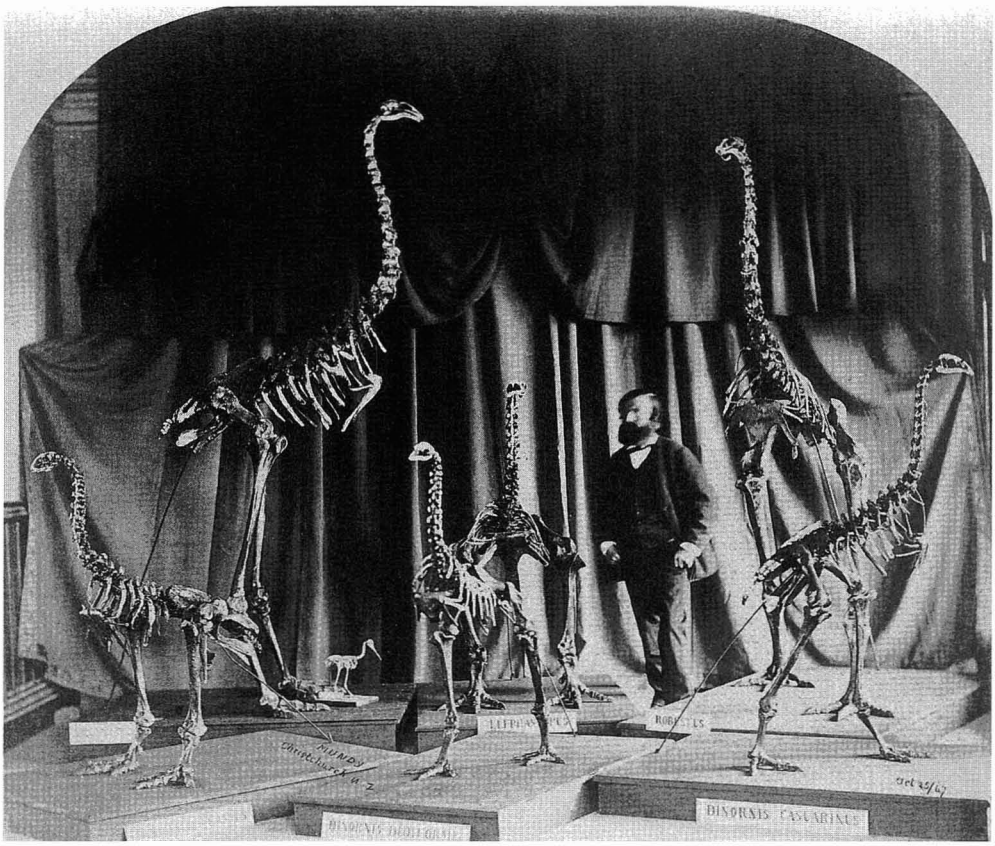

FIGURE 2. Julius Haast and the Glenmark moa skeletons, 1867. The temporary display in the Canterbury Provincial Council Building. Courtesy of the Canterbury Museum, Ref: 7558. (D. L. Mundy photograph, 23 October 1867.)

ernment granted funds in December 1868 to build the long-promised museum, and, in February 1869, offered Haast the position of director (Haast 1948 : 534–539, 595; Canterbury Museum, 1868–1870, Haast to Secretary for Public Works, 3 February 1869). A museum had existed as an appendage to the Geological Survey since Haast's appointment in 1862. Items had been housed in two rooms in the Provincial Council Building and the first moa skeletons put on display in the "Coffee Room" (Figure 2) (Haast 1948: 334–335, 535–536). But in 1870, with a permanent director and a purpose-built, stone building, the Canterbury Museum began a new phase.

Moa skeletons were the centerpiece of the collection. By 1871 there were seven articulated moa skeletons, three were added in 1872, and a further six in 1873, making a total of sixteen (Canterbury Museum, 1873, f. 10; Haast 1948 : 623). The museum's collections were also enriched by the sale and exchange of moa bones and moa skeletons (as well as thousands of bird skins). Moa skeletons were the most valuable: Haast swapped them with other museums, demanding impressive and large exhibits in exchange; others were sold, and at £20–50 each provided the means for purchasing what could not be obtained through exchange (Sheets-Pyenson 1988 : 81–82). Haast had

clear priorities for his collecting. He wanted to obtain specimens to represent each genus and for species that displayed remarkable beauty or form, or were rare, or were large and impressive (Haast 1948 : 626, Sheets-Pyenson 1988 : 80). Meanwhile, W. H. Flower (Owen's successor as conservator at the Museum of the Royal College of Surgeons), to whom Haast had been recommended by J. D. Hooker, acted as Haast's agent, buying and exchanging on Haast's behalf. He sent an ostrich skeleton, particularly important for use as a model when articulating moa skeletons, and many other large and impressive items, including, for example, skeletons and mounted skins of a gorilla, a giraffe, and an elephant (Sheets-Pyenson 1988 : 82).

The exchange books and Annual Reports of the Canterbury Museum list so many exchanges that one wonders how Haast and his small staff had time to pack and unpack the hundreds of boxes. An exchange with the Indian Museum in Calcutta brought rich returns: skeletons of an elephant, a tiger, and a python; a tiger and a leopard skin; and a mounted python melurus. Links with other colonial museums flourished without reference to any imperial centers. (Endersby [1997 : 28–33] has shown the significance of intercolonial links for botanic gardens.) Haast exchanged with museums in Bombay, Auckland, San Francisco, Cape Town, Adelaide, Ballarat, and Santiago, to name only a few of those recorded (Canterbury Museum 1985). With the Buenos Aires Museum, he exchanged moa bones for rhea skeletons, a flightless South American bird slightly smaller than an ostrich (Sheets-Pyenson 1988 : 83). He also exchanged with European museums: from Stockholm to Florence and dozens of museums in German-speaking lands in between; from the great British Museum to the museums of the English periphery, such as those of the city of Norwich and the School of Mines at Sandhurst. Norwich, for example, got a case of moa bones (not a skeleton) and Canterbury received in exchange 77 English vertebrate and invertebrate fossils. The demands were so great that the 1873 Annual Report of the Canterbury Museum warned that "the system of exchanges carried out by the Director," which was responsible for such economy of operation, could not be continued unless "further assistance" was provided (Canterbury Museum 1873, f. 6).

In buying as in swapping, Haast had worldwide connections. In 1875, he purchased four crocodiles from northern Australia, reporting proudly that one was "the finest and largest specimen seen in any museum" (Canterbury Museum 1875, f. 7). In 1876, through commercial networks in North America, Haast obtained a stuffed male adult grizzly bear for £31 (Haast 1848 : 782). In response the visitors flooded in. In his 1875 Report, Haast claimed 75,000 visitors during the year, an average of over two visits by every man, woman, and child in the Christchurch region (Canterbury Museum 1875, ff. 1–2; McKinnon 1997, plate 53).

Although Haast treated Owen with deference, his exchanges with the British Museum, where Owen had become superintendent of the natural history departments, caused friction. In spite of his German origins and his ties to Hochstetter and Vienna, Haast saved the best moa specimens for the British Museum, but, in a 5-year-long, polite but persistent correspondence with Owen, insisted that the great man pay commercial rates for moa skeletons or send good specimens in exchange. In May 1867, shortly after the Glenmark find made Haast rich in moa bones, Owen asked for a skeleton for the British Museum, although, according to Sheets-Pyenson, he really wanted it for his own research. He offered plaster casts of British Museum objects in exchange (Sheets-Pyenson 1988 : 81). Haast declined—plaster casts were not equivalent to the real thing—and referred Owen to Flower: "I may therefore perhaps suggest that if you cannot exchange specimens for them, that perhaps their value in money is handed over to Mr. Flower so that this gentleman may buy some collections in return for our embryo Museum which I am most anxious to advance" (5 April 1868 [cited by Gruber 1987*a* : 84–85]). It was difficult to decline requests from Britain's preeminent comparative anatomist. Flower himself capitulated when Owen asked that *all* the moa bones in Flower's possession, including

those belonging to the College of Surgeons, be sent to him. It was a year before the British Museum paid £15 to Flower for those bones that Owen wished to keep (Gruber 1987*a*: 85).

Owen continued to expect, and Haast to concede, priority in choosing specimens and in intellectual position. Thus in January 1872 Haast wrote to Owen: "I had an offer for the skeleton of D. *giganteus* of £150, from a gentleman going home & he would have paid me even £200, if only I had asked for it ... but I thought, & the Trustees of the Museum agreed with me, that you ought to possess it, in order not only to continue your classical publications on the subject, but also as a fine representation ... in the National collections" (cited by Gruber 1987*a*: 85). Haast made clear what was wanted in exchange: "We should like principally not a quantity of objects of Natural History but rare objects which are not easily to be obtained." Owen continued his imperious and imperial expectations, and 18 months later Haast again supported his demand for a fair deal by appeal to the authority of his museum trustees: "I had a full meeting of the Trustees of this Institution & they fully endorsed my views, that unless the British Museum can offer us *adequate* returns for the fine skeleton of *Dinornis maximus* I sent you, & which is worth to us at least £200, you have to consider it as a loan & will be good enough to return it to us as soon as you have described it. I shall not point out the value of such a specimen to the British Museum & I am only astonished that an Institution of such enormous means should not try to obtain such a specimen as I offered for exchange when thousands & thousands are spent on Antiquities, the more so when it is sent by a provincial Museum of a comparatively small Colony" (27 October 1873 [cited by Gruber 1987*a*: 85–86]). [The price of moa skeletons seems to be rising through this correspondence, and to be much larger than the prices of £20–50 given by Sheets-Pyenson (1988: 81–82). It is unlikely that Haast was trying to fool Owen. I suggest that because the specimens identified in these letters were of large species, and because Haast was saving the best specimens for the British Museum, the prices would be much higher than average prices. There were many species of moa, and the smaller species were by far the more common.]

CLASSIFYING MOA BONES: NEW ZEALAND AS A CENTER OF CALCULATION

By this time Haast was beginning to expect that Owen would take note of his interpretations. In September 1872, Haast told Owen that his researches had shown that Owen's determinations of Dinornis species were "wonderfully correct" (Gruber 1987*a*: 99, note 86). This seems excessive deference, because Haast must have been aware of Hochstetter's published doubt over "whether all the species, distinguished by Prof. Owen, are good species" (Hochstetter 1867: 183). Haast first expressed doubts about Owen's conclusions in March 1873 when he gently complained that Owen had edited Haast's conclusion to suit his own, giving the impression that Haast agreed with Owen (Gruber 1987*a*: 88). In August, Owen replied that his "kind friends" should restrict themselves to "time" and "place" and trust Owen to be responsible for his own conclusions. Owen did not want to pass over the opinions of others but, also, did not want to advocate opinions that he believed to be erroneous (Gruber 1987*a*: 88).

Haast persisted in asserting his own interpretive competence. In October 1873, in the same letter in which he requested payment of up to £200 for a *Dinornis maximus,* Haast refused to accept the role of colonial collector to imperial interpreter. He complained that Owen expected him to send specimens unclassified, as had Walter Mantell 20 years earlier. First, in articulating skeletons, Haast explained that he had to go beyond Owen's work and interpret independently. Second, he challenged the principle that those at the center were best equipped to make taxonomic decisions. Haast suggested that local knowledge was an advantage: that having seen the specimens in situ he had knowledge that Owen did not have and therefore, "loyalty to truth" compelled him to point out

when Owen was "not quite correct" (Gruber 1987*a*: 89). Finally and uncharacteristically, a year later, in the letter quoted in the opening paragraph of this paper, Owen acknowledged that it might be time to pass leadership on to Haast (Gruber 1987*a*: 89–90).

There were serious problems with Owen's taxonomy, and it is not surprising that Haast was having difficulty fitting his specimens to Owen's descriptions. Owen's taxonomy was based on the length of bones, but, as Hochstetter pointed out, within each moa species there is great variability in the size of individuals (Hochstetter 1867: 183). F. W. Hutton, in a paper read to the Wellington Philosophical Society in 1872, suggested that some of Owen's species were the young of other species (1873: 232). The experts in London complained bitterly when Mueller's carelessness confused systematics (Moore 1997: 375–376, 379); the experts in New Zealand were more polite about Owen's failings, but, by the end of the century, publications from New Zealand naturalists were openly critical of Owen's work. Hutton, about to be appointed director of the Canterbury Museum, pointed out that of the nineteen species made by Sir Richard Owen, only three were described from the bones of a single individual, and he named nine of Owen's species that were made up of bones belonging to more than one species (1892: 100). T. Jeffery Parker, professor of biology in the University of Otago, in a paper read before the Zoological Society of London, Owen's home ground, and only months after Owen's death, began: "A first glance at the magnificently illustrated series of memoirs by Sir Richard Owen on the osteology of the Dinornithidae gives the impression that the whole subject has been exhausted; but a more careful perusal, ... is enough to show that the material at Sir R. Owen's disposal was far from complete, that skulls were assigned to the skeletons of species on purely conjectural grounds, and that some of the figures were even made up of portions belonging to different species. The reason of this confusion is that it is extremely seldom that the bones of a single individual skeleton, or even of a single individual skull, are found associated together and apart from those of other individuals" (Parker 1895: 373). Taxonomic confusion was the consequence. Most of Owen's type specimens required redefining, specifying which particular bone of those in the assemblage was to be taken as the type bone to define the species (Archey 1941: 7–8).

Owen's problems arose from the peculiarities of moa variability, from the fragmentary nature of the individual skeletons upon which most of his species were defined, and from his excessive confidence in his homological arguments (Archey 1941: 7–8, Anderson 1989: 23–24, 38). In Latour's phrase, Owen occupied a center of calculation, where moa bones were accumulated, measured, compared, and reassembled so that their position in the classification hierarchy could be assigned (Latour 1987: 215–240, Miller 1996: 23–25). Center of interpretation is a more appropriate term for paleontological science. The problem was that moa bones were not stable when taken from New Zealand to London. Too much information about location and association was not transmitted. Haast did not escape these problems completely. Parker identified three moa skeletons in the Canterbury Museum that had skulls misassigned (Parker 1895: 414). But Haast, unlike Owen, was willing to admit uncertainty. Haast's 1874 classification of moa into 11 species, which was widely accepted outside New Zealand, contrasts with Owen's classifications into 14 species in 1868 and 18 species in 1882. Haast was more cautious, rejecting species for which there was insufficient material (Anderson 1989: 24, 209–210).

MOA BONES AND INTERNATIONAL HONORS

Haast remained deferential and polite to Owen. When he described a new species in 1885, he named it for Owen, *Dinornis oweni* (Anderson 1989: 25). In the 1870s, almost all new species were still first sent to Owen, who maintained his imperial position as interpreter. It was therefore a shock in December 1873 when Owen found that Haast had sent

a skeleton to Alphonse Milne-Edwards in Paris. Owen wrote urgently, appealing to Haast's national pride, to warn of the danger that Milne-Edwards might anticipate Owen in describing *Dinornis maximus,* for although Owen already had a specimen he was many years behind in describing his rich collections (Gruber 1987*a*:99, note 82). Haast returned to his well-worn themes, pointing out that the Paris Museum, *unlike* the British Museum, offered generous terms in exchange for moa bones; spreading the responsibility for Canterbury Museum action to the trustees; and assuring Owen of his loyalty. In return for a small collection of moa bones: "the Paris Museum sent *at once,* on receipt of my letter, a considerable quantity of these desiderata & promised to procure still others, so that the Paris Museum would in this respect do more than your own great National Institution. And this was one of the reasons that our Trustees suggested that the skeleton of Din. maximus in your hands should be sent over to Paris, against which, of course, I rebelled. For more than two years we had been collecting the material for the articulation of that skeleton, which I trusted you would describe & I possess too much loyalty to interfere with it.... I once more wish to assure that any day I could get £300 for the skeleton in question so that a *poor* provincial Museum has acted very handsomely towards an Institution which has about hundred times the income of it" (18 March 1874 [cited by Gruber 1987*a*:86]).

However, there is another interpretation. Haast was cultivating the goodwill of Milne-Edwards, who had suggested to Haast that he might be appointed a corresponding member of the Geological Section of the Académie des Sciences (Haast 1948:453, Sheets-Pyenson 1988:35). Haast was well versed in the practice of seeking scientific and state recognition through symbolic exchange. At the beginning of his scientific career he had, for example, sent Owen a copy of his report on the Nelson province and let Owen know that he had named a mountain range and a river after him (Gruber 1987*a*:82). In 1865, he named an impressive glacier after Emperor Franz Joseph of Austria (Haast 1948:424). This was part of a series of gifts and exchanges, mediated by Haast's mentor, Hochstetter, that led to Haast's being made a knight of the order of Franz Joseph in 1865 and receiving a personal gift from the emperor of an emerald ring set with two rows of diamonds (Haast 1948:446–448, 512). In 1873, he named adjoining glaciers Napoléon and Eugénie and sent a watercolor of the glaciers to Charles Maunoir, the geographer, in Paris, asking him to show the painting to their imperial majesties. These investments brought no immediate return; Haast received no honors in France until 1886 (Haast 1948:453, 925).

In the economy of symbolic goods, neither the time nor the form of the return is fixed (Bourdieu 1977:6–8, 171–173). However, the high value of the moa in the symbolic economy is illustrated by Haast's second, 1875 award from the Emperor Franz Joseph. The emperor was greatly impressed by the size of the moa skeletons in the New Zealand exhibit at the Vienna International Exhibition in 1873 and had also admired the stuffed birds. After the exhibition, Hochstetter and Haast corresponded over the possibility of a knighthood for Haast. Haast had enriched the Austrian collections through many museum exchanges, and Hochstetter, recently appointed tutor to the crown prince, advised Haast that moa for the imperial collections in Vienna would be valued highly by the emperor. Haast obliged—with three moa skeletons, stuffed birds, and some Maori skulls. The strategy was effective. Haast was offered the Order of the Iron Crown, 3rd class, in 1874. Hochstetter continued to guide his protégé, advising Haast to include in his letter of acceptance the assurance "that it would always be a pleasure to you to enrich the Imperial Museum." After obtaining permission from the British government to accept a foreign honor, paying his 200 florins, and choosing his coat of arms, Haast duly became von Haast in 1875 (Haast 1948:675, 775–777). Haast was also seeking British imperial honors, but was not satisfied until 1886, when he received a KCMG (Knight Commander of St. Michael and St. George) (Haast 1848:775, 930). Thus, in the last year

of his life, he was able to style himself Sir Julius von Haast.

CONCLUSIONS

Colonies, like travel, provided opportunities for scientific achievement, even to those who remained at the periphery. Advantages accrued to those who had privileged access to local flora, fauna, and landscape. Although particularly memorable, the moa was only one element in Haast's success, because he had been elected a Fellow of the Royal Society in 1867 for his geological work, before his moa reconstructions gave him a wider fame. The international reputation emphasized here did not always translate into local standing. One Canterbury provincial councillor complained that Haast made "a European reputation at the expense of the Province" (Haast 1948 : 518). The provincial geologist was expected to find gold and coal, far more important than moa bones to the Canterbury colonists. In the moa, however, New Zealand colonial scientists found a problem of world significance. Geology and geography meant that at species, genus, and family level, moa were unique to New Zealand and therefore it was possible to classify in New Zealand. Thus, in regard to the moa, New Zealand could become a center of calculation. Other New Zealand and Australian fauna were similarly unique, but the size and apparent helplessness of the flightless bird gave it popular fame. In these circumstances, moa bones, through hard work and wise judgement, were turned into international reputation and local wealth; articulated moa skeletons were both symbolic capital and real capital. There were benefits to geographical isolation.

ACKNOWLEDGMENTS

I am grateful to the Canterbury Museum Archives, the National Archives Christchurch Office, the Museum of New Zealand Archives, and the Turnbull Library for access to papers in their collections and to the archivists of those collections who assisted in my searches. Material from the Colonial Museum papers is quoted by permission of the Museum of New Zealand. Papers from the Records of the Canterbury Provincial Government are quoted by permission of the National Archives. Discussions with Jim Endersby and Gordon Winder have enriched my analysis. Heather Nicholson, John Andrews, James Moore, and David Miller have saved me from errors of fact and interpretation. Christian Leitz assisted with German language material. I thank them all.

LITERATURE CITED

ANDERSON, A. 1989. Prodigious birds: Moas and moa-hunting in prehistoric New Zealand. Cambridge University Press, Cambridge.

ANDREWS, J. R. H. 1986. A giant struthious bird. Pages 123–140 *in* The southern ark: Zoological discovery in New Zealand 1769–1900. Century Hutchinson New Zealand, Auckland.

ARCHEY, G. 1941. The moa: A study of the Dinornithiformes. Bull. Auckl. Inst. Mus. No. 1. Unity Press, Auckland.

BASALLA, G. 1967. The spread of Western science. Science (Washington, D.C.) 156 (3775): 611–621.

BOURDIEU, P. 1977. Outline of a theory of practice, translated by R. Nice. Originally published in 1972. Cambridge University Press, Cambridge.

BUTCHER, B. 1988. Darwin's Australian correspondents: Deference and collaboration in colonial science. Pages 139–157 *in* R. MacLeod and P. Rehbock, eds. Nature in its greatest extent: Western science in the Pacific. University of Hawai'i Press, Honolulu.

CANTERBURY MUSEUM. 1868–1870. In Records of the Canterbury Provincial Government, National Archives Christchurch Office. Archives reference: Accession CH 287, Special Subject File, Item CP 349c.

———. 1873. Reports of the Canterbury Museum year ending 30 September 1873. In Records of the Canterbury Provincial

Government, National Archives Christchurch Office. Archives reference: Accession CH 287, Papers of the Provincial Council, Item CP 656b/3.

———. 1875. Report of the director of the museum for 18 months to 31 March 1875. In Records of the Canterbury Provincial Government, National Archives Christchurch Office. Archives reference: Accession CH 287, Special Subject File, Item CP 349d.

———. 1985. Canterbury Museum exchanges, 1869–1883. Transcribed (in October 1985) from the original Exchange Book by Sally Barrage. Canterbury Museum Archives.

CHAMBERS, D. W. 1991. Does distance tyrannize science? Pages 19–38 *in* R. W. Home and S. G. Kohlstedt, eds. International science and national scientific identity: Australia between Britain and America. Kluwer, Dordrecht.

COLONIAL MUSEUM. Museum of New Zealand (Wellington), Archives. Individual letters are identified by author, recipient, date, and two numbers, the collection number and box number (e.g., MU198/1).

ENDERSBY, J. 1997. A garden enclosed: Giving order to people and plants at the Sydney Botanic Garden, 1818–1841. B.A. (Honours) thesis, School of Science and Technology Studies, University of New South Wales.

GRUBER, J. W. 1987*a*. The moa and the professionalising of New Zealand science. Turnbull Library Rec. 20 (2): 61–100.

———. 1987*b*. From myth to reality: The case of the moa. Arch. Nat. Hist. 14 (3): 339–352.

HAAST, H. F. VON. 1948. The life and times of Sir Julius von Haast, explorer, geologist, museum builder. Avery Press, Wellington.

HAAST, J. 1869 (read 28 July 1868). On the measurements of *Dinornis* bones, obtained from excavations in swamp situated at Glenmark on the property of Messrs. Kermode & Co., up to February 15, 1868. Trans. Proc. N. Z. Inst. 1, 2nd ed.: 21–30 (numbered 80–89 in the first edition of the Transactions).

HOCHSTETTER, F. VON. 1867. New Zealand: Its physical geography, geology and natural history. Translated from the German, 1863, with additions by the author. J. G. Gotha, Stuttgart.

HUTTON, CAPTAIN W. F. 1873 (read 4 and 11 September 1872). On the geographical relations of the New Zealand fauna. Trans. Proc. N. Z. Inst. 5:227–256.

———. 1892 (read 1 October and 4 November 1891). The moas of New Zealand. Trans. Proc. N. Z. Inst. 24:93–172.

INKSTER, I. 1985. Scientific enterprise and the colonial 'model': Observations on Australian experience in historical context. Soc. Studies Sci. 15 (4): 677–704.

KNIGHT, D. 1991. Tyrannies of distance in British science. Pages 39–53 *in* R. W. Home and S. G. Kohlstedt, eds. International science and national scientific identity: Australia between Britain and America. Kluwer, Dordrecht.

LANGER, W. 1992. Der Bonner Neuseelandforscher Sir Johann Franz Julius Haast (1822–1887). Bonn. Geschichtsblätter 39 (1989/1992): 273–293.

LATOUR, B. 1987. Science in action: How to follow scientists and engineers through society. Harvard University Press, Cambridge, Massachusetts.

MACLEOD, R. M. 1982. On visiting the 'moving metropolis': Reflections on the architecture of imperial science. Hist. Rec. Aust. Sci. 5 (3): 1–16.

MALING, P. B. 1990. Johann Franz Julius von Haast. Pages 167–169 *in* The dictionary of New Zealand biography. Vol. 1, 1769–1869. Allen & Unwin/Department of Internal Affairs, Wellington.

MCKINNON, M., ED., with B. BRADLEY and R. KIRKPATRICK. 1997. New Zealand historical atlas. David Bateman, Auckland.

MILLER, D. P. 1996. Joseph Banks, empire, and "centres of calculation" in late Hanoverian London. Pages 21–37 *in* D. P. Miller and P. H. Reill, eds. Visions of empire: Voyages, botany, and representations of nature. Cambridge University Press, Cambridge.

MOORE, J. 1997. Green gold: The riches of Baron Ferdinand von Mueller. Hist. Rec. Aust. Sci. 11 (3): 371–388.

MUSEUM OF THE ROYAL COLLEGE OF SURGEONS. 1845. Illustrated London News, 4 October. Page 35 *in* Panorama 1842–1865: The world of the early Victorians as seen through the eyes of the "Illustrated London News." Reprinted by Leonard de Vries, ed., 1967. Murray, London.

NEWLAND, E. D. 1991. Dr George Bennett and Sir Richard Owen: A case study of the colonization of early Australian science. Pages 55–74 *in* R. W. Home and S. G. Kohlstedt, eds. International science and national scientific identity: Australia between Britain and America. Kluwer, Dordrecht.

PARKER, T. J. 1895 (read 4 February 1893). On the cranial osteology, classification, and phylogeny of the *Dinornithidae.* Trans. Zool. Soc. Lond. 13 (2): 373–431.

REINGOLD, N., and M. ROTHENBERG, EDS. 1987. Scientific colonialism: A cross-cultural comparison. Smithsonian Institution Press, Washington, D.C.

RUPKE, N. 1994. Richard Owen: Victorian naturalist. Yale University Press, New Haven.

SHEETS-PYENSON, S. 1988. Cathedrals of science: The development of colonial natural history museums during the late nineteenth century. McGill-Queen's University Press, Kingston and Montreal.

STOFFEL, G. M. 1993. The Austrian connection with New Zealand in the nineteenth century. Pages 21–34 *in* J. N. Bade, ed. The German connection: New Zealand and German-speaking Europe in the nineteenth century. Oxford University Press, Auckland.